ORIGINAL

Print Form

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY
FILE NO. BmmL-20091021ACU

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)
CBS Corporation

MAILING ADDRESS (Line 1) (Maximum 35 characters)
2175 K Street NW

MAILING ADDRESS (Line 2) (Maximum 35 characters)
Suite 350

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Washington	DC	20037

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
202-457-4505	WQYK	FAC ID 28629

2. A. Is a fee submitted with this application? Yes [X] No [ ]

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

[ ] Governmental Entity [ ] Noncommercial educational licensee [ ] Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
M M R	0 0 0 1	$ 615	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
M O R	0 0 0 1	$ 705	

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE.
THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
$ 1,320	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT CBS Radio Inc. of Tampa		
MAILING ADDRESS 2175 K Street NW., Suite 350		
CITY Washington	STATE DC	ZIP CODE 20037

2. This application is for:

☒ Commercial ☐ Noncommercial

☒ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
WQYK				

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☐ No

If No, explain in an Exhibit.

Exhibit No.

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No.

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect? If Yes, explain in an Exhibit.

☐ Yes ☐ No

Exhibit No.

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☒ Does not apply

If No, explain in an Exhibit.

Exhibit No.

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☒ Yes ☐ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☒ No

If Yes, provide particulars as an Exhibit.

Exhibit No. 1

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☒ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
Stephen A. Hildebrandt	S A Hildebrandt	
Title	Date	Telephone Number
Assistant Secretary	10-19-09	202-457-4505

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant: CBS Radio Inc. of Tampa

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☑ Station License ☐ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
WQYK	N/A	1010	UNLIMITED	5	50

2. Station location

State	City or Town
SEFFNER	FLORIDA

3. Transmitter location

State	County	City or Town	Street address (or other identification)
FL	HILLSBOROUGH	SEFFNER	1718 E. SR 574

4. Main studio location

State	County	City or Town	Street address (or other identification)
FL	PINELLAS	ST. PETERSBURG	9721 EXECUTIVE CENTER DR. N.

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
FL	PINELLAS	ST. PETERSBURG	9721 EXECUTIVE CENTER DR. N.

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ NoCcCBS ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. ENG.

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
10.39	32.4

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50.0	50.0	-j2.0	-j2.0

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 1031701	+13.7	+18.0	0.677	0.577	-	-
2 1031702	0.0	0.0	1.000	1.000	-	-
3 1031703	-13.1	-17.5	0.581	0.494	-	-

Manufacturer and type of antenna monitor: POTOMAC INSTRUMENTS 1901

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
UNIFORM CROSS-SECTION, STEEL GUYED	79.2	80.6	81.1	Exhibit No. N/A

Excitation ☑ Series ☐ Shunt

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude	West Longitude
27 ° 59 ' 25 "	82 ° 15 ' 06 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. ENG.

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. N/A

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

NONE

11. Give reasons for the change in antenna or common point resistance.

N/A

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature
RONALD D. RACKLEY	Ronald D. Rackley
Address (include ZIP Code) DLR, INC. 201 FLETCHER AVENUE SARASOTA, FL 34237	Date 10/15/2009 Telephone No. (Include Area Code) 941-329-6000

☐ Technical Director ☑ Registered Professional Engineer

☐ Chief Operator ☐ Technical Consultant

☐ Other (specify)

CHARACTER RELATED ALLEGATIONS

Character allegations have been raised in a petition to deny filed on September 1, 2004 by Right to Decency, Inc. and the American Decency Association ("Petitioners") against the application for renewal of license (FCC File No. BRH-20040601BHZ) of WXYT-FM (formerly WKRK-FM) Detroit, Michigan, a station that is commonly owned with WQYK (AM). Petitioners suggest that the licensee of WXYT-FM lacks the basic character qualifications to be a Commission licensee because of alleged violations of the Commission's rule on the broadcast of indecent material.

On November 23, 2004, the FCC approved a Consent Decree entered by Viacom Inc. ("Viacom") [1] then the ultimate owner of WQYK (AM) and WXYT-FM, which resolved all allegations that Viacom and its licensee subsidiaries had violated the broadcast indecency laws with respect to any material broadcast before that date, with the exception of the CBS Television Network's coverage of the Super Bowl half-time show on February 1, 2004. In its order approving the Consent Decree, the Commission stated that "there are no substantial and material questions of fact in regard to these matters as to whether Viacom possesses the basic qualifications, including its character qualifications, to hold or obtain any FCC licenses or authorizations." *In the Matter of Viacom Inc., et al.,* 19 FCC Rcd. 23100 (2004).

[1] As of December 31, 2005, Viacom effected a corporate reorganization in which the name of the ultimate parent company of its owned radio and television stations was changed to CBS Corporation.

ADVERSE FINDINGS STATEMENT

THERE HAVE BEEN NO REPORTABLE ADVERSE FINDINGS OR FINAL ACTIONS MADE OR TAKEN AGAINST THE APPLICANT OR ITS PARENT COMPANIES OR AFFILIATES EXCEPT AS HAVE BEEN PREVIOUSLY REPORTED TO THE COMMISSION PURSUANT TO SECTION 1.65 OF THE COMMISSION'S RULES AND IN OTHER MAJOR APPLICATIONS FILED WITH THE COMMISSION.

EXHIBIT
WQYK(FM)
302 License Application

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ORIGINAL

0910219084824001

du Treil, Lundin & Rackley, Inc.
Consulting Engineers

APPLICATION FOR LICENSE
INFORMATION
RADIO STATION WQYK
SEFFNER, FLORIDA

October 15, 2009

1010 KHZ 50 KW-D 5 KW-N U DA-2

APPLICATION FOR LICENSE
INFORMATION
RADIO STATION WQYK
SEFFNER, FLORIDA

1010 KHZ 50 KW-D 5 KW-N U DA-2

Executive Summary

Executive Summary- WQYK

This engineering exhibit supports an application for Direct Measurement of Power (requesting modification of the station license to specify new antenna monitor operating parameters) for the directional antenna system of radio station WQYK in Seffner, Florida. WQYK operates fulltime on 1010 kilohertz with 50 kilowatts daytime and 5.0 kilowatts nighttime power, using different directional antenna patterns day and night hours.

The WQYK antenna monitor sampling system was modified by adding sampling line at the tower 2 antenna monitor input to make all three sampling lines equal in length, within the required tolerance, before the antenna monitor parameters were adjusted to those shown herein. The towers, the ground system and the phasing and coupling equipment all remain unchanged. No modification requiring a construction permit has been made.

Information is provided herein demonstrating that the directional antenna parameters for both the daytime and nighttime patterns have been determined in accordance with the requirements of section 73.151(c) of the FCC Rules. The system has been adjusted to produce antenna monitor parameters within +/- 5 percent in ratio and +/- 3 degrees in phase of the modeled values, as required by the Rules.

Ronald D. Rackley, P.E.
October 15, 2009

Analysis of Tower Impedance Measurements to Verify Method of Moments Model - WQYK

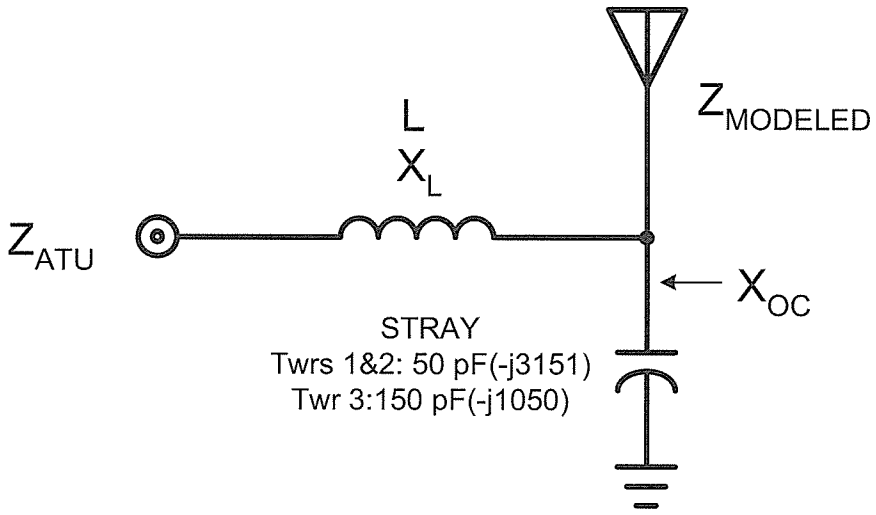
Tower base impedance measurements were made at the final J-plugs within the Antenna Tuning Units ("ATUs") using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The other towers were all open circuited at the same points where impedance measurements were made for them (the "reference points") for each of the measurements.

The reference point in each ATU is adjacent to the sampling transformer of the antenna monitor system at the output of the ATU enclosure. The current passes directly from that point over conductors through the enclosure insulator and on to the tower above the base insulator. There are no components in shunt with the tower 1 and 2 ATU outputs following the sampling transformers other than static drain chokes, which have very high impedances and were found to not require consideration in the process of calibrating the method of moments model to the measured base impedances. Tower 3 has three isocouplers across its base. Circuit calculations were performed to relate the method of moments modeled impedances of the tower feedpoints to the ATU output measurement (reference) points as shown on the following pages. The Xoc shown for each tower, which was calculated for the assumed stray capacitance, was used in the method of moments model as a load at ground level for the open circuited case.

In addition to the page showing the schematic of the assumed circuit and tabulation of calculated values, pages showing the results of calculations using the WCAP network analysis program from Westberg Consulting are provided. WCAP performs such calculations using nodal analysis, as do other modern circuit analysis programs such as the commonly available ones based on SPICE software.

In each of the WCAP tabulations, node 2 represents the ATU output reference point and node 3 represents the tower feedpoint. Node 0 represents ground potential. It should be noted that the calculated ATU output impedances appear under the "TO NODE IMPEDANCE" columns of the WCAP tabulations, following the phantom 1.0 ohm resistors (R 1 - 2) that were included in series with the drive current sources (I 0 -1)) to provide calculation points for the impedances. The tower feedpoint impedances from the method of moments model are represented by complex loads from node 3 to ground (R 3 - 0). The stray capacitance of 50 picofarads for towers 1 and 2 and 150 picofarads for tower 3 was assumed, although it appears as 0.0000 (microfarad) on the WCAP printout due to rounding. The numerals in the file names shown on the tabulations correspond to the tower numbers.

The modeled and measured base impedances at the ATU output jacks with the other towers open circuited at their ATU output jacks agree within +/- 2 ohms and +/- 4 percent for resistance and reactance, as required by the FCC Rules.



TOWER	L(uH)	X_L	X_{OC}	$Z_{MODELED}$	$Z_{ATU\ (MODELED)}$	$Z_{ATU\ (MEASURED)}$
1	4.223	j26.8	-j3151	69.0 + j81.7	72.6 + j109.0	72.7 + j109.0
2	4.885	j31.0	-j3151	73.6 + j87.5	77.8 + j119.1	77.5 + j119.1
3	0.819	j5.2	-j1050	73.6 + j91.3	87.7 + j98.5	87.3 + j98.5

ANALYSIS OF TOWER IMPEDANCE MEASUREMENTS TO VERIFY METHOD OF MOMENTS MODEL

RADIO STATION WQYK
SEFFNER, FLORIDA
1010 KHZ 50 KW-D 5 KW-N U DA-2

du Treil, Lundin & Rackley, Inc. Sarasota, Florida

Tower 1

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK1OC.CIR

I	1.0000	0	1	0.0000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	4.2230	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	68.9610	3	0	81.6900	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	131.5718	55.9636
2	131.0147	56.3260
3	109.7230	48.5428

				BRANCH VOLTAGE		BRANCH CURRENT	FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
VSWR											
R	1-	2	1.000	1.00	0.000	1.00	0.000	73.64	109.03	72.64	109.03
L	2-	3	4.223	26.80	90.000	1.00	0.000	72.64	109.03	72.64	82.23
C	3-	0	0.000	109.72	48.543	0.03	138.543	0.00	-3151.58	0.00	-3151.58
R	3-	0	68.961	109.72	48.543	1.03	-1.287	68.96	81.69	68.96	81.69

Tower 2

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK2OC.CIR

I	1.0000	0	1	0.0000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	4.8850	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	73.5690	3	0	87.4590	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	142.7896	56.5130
2	142.2403	56.8489
3	117.5150	48.5546

				BRANCH VOLTAGE		BRANCH CURRENT	FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
VSWR											
R	1-	2	1.000	1.00	0.000	1.00	0.000	78.78	119.09	77.78	119.09
L	2-	3	4.885	31.00	90.000	1.00	0.000	77.78	119.09	77.78	88.09
C	3-	0	0.000	117.52	48.555	0.04	138.555	0.00	-3151.58	0.00	-3151.58
R	3-	0	73.569	117.52	48.555	1.03	-1.375	73.57	87.46	73.57	87.46

Tower 3

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK3OC.CIR

I	1.0000	0	1	0.0000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	0.8190	2	3	0.0000	0.0000	0.0000
C	0.0001	3	0	0.0000	0.0000	0.0000
R	73.5500	3	0	91.3160	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	132.5411	47.9899
2	131.8739	48.3127
3	128.0392	46.7658

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE		
			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE	VSWR
R	1-	2	1.000	1.00	0.000	1.00	0.000	88.70	98.48	87.70	98.48
L	2-	3	0.819	5.20	90.000	1.00	0.000	87.70	98.48	87.70	93.28
C	3-	0	0.000	128.04	46.766	0.12	136.766	0.00	-1050.53	0.00	-1050.53
R	3-	0	73.550	128.04	46.766	1.09	-4.385	73.55	91.32	73.55	91.32

Derivation of Operating Parameters for Daytime Directional Antenna - WQYK

The method of moments model of the array, following verification with the measured individual open circuited base impedances, was utilized for directional antenna calculations. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. With these voltage sources, the tower currents were calculated. The currents at the ATU outputs, where the antenna monitor samples are taken, were calculated from the method of moments tower currents for directional antenna operation using WCAP circuit modeling with the assumptions that were derived from the single tower measurements on the array and the method of moments calculated tower operating impedances. In each of the following WCAP tabulations, node 2 represents the ATU output reference point and node 3 represents the tower feedpoint. Node 0 represents ground potential. The tower operating impedances are represented by complex loads from node 3 to ground (R 3 - 0). It should be noted that the calculated ATU output current magnitudes and phases appear in the first and fourth columns following the drive current sources (I 0 - 1)). As the current transformers and sampling lines are identical, the antenna monitor ratios and phases corresponding to the theoretical parameters were calculated directly from the modeled ATU currents.

TOWER	Modeled Current Pulse	Current Magnitude @ Toroid (amperes)	Current Phase @ Toroid (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase (degrees)
1	1	14.85	24.2	0.577	18.0
2	11	25.73	6.2	1.000	0.0
3	21	12.70	-11.3	0.494	-17.5

Tower 1

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK1DAD.CIR

I	14.8500	0	1	24.1600	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	4.2230	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	35.7460	3	0	64.9160	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	1488.5369	91.7213
2	1482.9323	92.2516
3	1123.5599	84.6571

				BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE		
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE	VSWR
R	1-	2	1.000	14.85	24.160	14.85	24.160	38.26	92.65	37.26	92.65	
L	2-	3	4.223	397.97	114.160	14.85	24.160	37.26	92.65	37.26	65.85	
C	3-	0	0.000	1123.56	84.657	0.36	174.657	0.00	-3151.58	0.00	-3151.58	
R	3-	0	35.746	1123.56	84.657	15.16	23.496	35.75	64.92	35.75	64.92	

Tower 2

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK2DAD.CIR

I	25.7300	0	1	6.1900	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	4.8850	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	47.7870	3	0	71.2370	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	2959.9065	69.8671
2	2948.5872	70.3153
3	2257.9060	61.4468

				BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE		
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE	VSWR
R	1-	2	1.000	25.73	6.190	25.73	6.190	51.01	103.11	50.01	103.11	
L	2-	3	4.885	797.64	96.190	25.73	6.190	50.01	103.11	50.01	72.11	
C	3-	0	0.000	2257.91	61.447	0.72	151.447	0.00	-3151.58	0.00	-3151.58	
R	3-	0	47.787	2257.91	61.447	26.32	5.301	47.79	71.24	47.79	71.24	

Tower 3

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK3DAD.CIR

I	12.7000	0	1	348.6700	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	0.8190	2	3	0.0000	0.0000	0.0000
C	0.0001	3	0	0.0000	0.0000	0.0000
R	47.7280	3	0	62.5730	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	1120.6757	40.2467
2	1112.8276	40.7590
3	1061.5255	38.5694

				BRANCH VOLTAGE		BRANCH CURRENT FROM NODE IMPEDANCE		TO NODE IMPEDANCE			
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
VSWR											
R	1-	2	1.000	12.70	-11.330	12.70	-11.330	54.84	69.13	53.84	69.13
L	2-	3	0.819	66.01	78.670	12.70	-11.330	53.84	69.13	53.84	63.94
C	3-	0	0.000	1061.53	38.569	1.01	128.569	0.00	-1050.53	0.00	-1050.53
R	3-	0	47.728	1061.53	38.569	13.49	-14.096	47.73	62.57	47.73	62.57

Derivation of Operating Parameters for Nighttime Directional Antenna - WQYK

The method of moments model of the array, following verification with the measured individual open circuited base impedances, was utilized for directional antenna calculations. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. With these voltage sources, the tower currents were calculated. The currents at the ATU outputs, where the antenna monitor samples are taken, were calculated from the method of moments tower currents for directional antenna operation using WCAP circuit modeling with the assumptions that were derived from the single tower measurements on the array and the method of moments calculated tower operating impedances. In each of the following WCAP tabulations, node 2 represents the ATU output reference point and node 3 represents the tower feedpoint. Node 0 represents ground potential. The tower operating impedances are represented by complex loads from node 3 to ground (R 3 - 0). It should be noted that the calculated ATU output current magnitudes and phases appear in the first and fourth columns following the drive current sources (I 0 -1)). As the current transformers and sampling lines are identical, the antenna monitor ratios and phases corresponding to the theoretical parameters were calculated directly from the modeled ATU currents.

TOWER	Modeled Current Pulse	Current Magnitude @ Toroid (amperes)	Current Phase @ Toroid (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase (degrees)
1	1	5.16	19.3	0.677	13.7
2	11	7.62	5.6	1.000	0.0
3	21	4.43	-7.5	0.581	-13.1

Tower 1

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK1DAN.CIR

I	5.1600	0	1	19.3200	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	4.2230	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	44.4000	3	0	66.0570	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	541.1884	82.5058
2	538.8804	82.9955
3	419.4438	74.5887

				BRANCH VOLTAGE		BRANCH CURRENT	FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
VSWR											
R	1-	2	1.000	5.16	19.320	5.16	19.320	47.31	93.60	46.31	93.60
L	2-	3	4.223	138.28	109.320	5.16	19.320	46.31	93.60	46.31	66.80
C	3-	0	0.000	419.44	74.589	0.13	164.589	0.00	-3151.58	0.00	-3151.58
R	3-	0	44.400	419.44	74.589	5.27	18.496	44.40	66.06	44.40	66.06

Tower 2

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK2DAN.CIR

I	7.6200	0	1	5.5900	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	4.8850	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	42.4670	3	0	67.9970	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	835.9112	71.1701
2	832.7898	71.6474
3	624.2980	62.8145

				BRANCH VOLTAGE		BRANCH CURRENT	FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
VSWR											
R	1-	2	1.000	7.62	5.590	7.62	5.590	45.35	99.89	44.35	99.89
L	2-	3	4.885	236.22	95.590	7.62	5.590	44.35	99.89	44.35	68.89
C	3-	0	0.000	624.30	62.814	0.20	152.814	0.00	-3151.58	0.00	-3151.58
R	3-	0	42.467	624.30	62.814	7.79	4.801	42.47	68.00	42.47	68.00

Tower 3

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WQYK3DAN.CIR

I	4.4300	0	1	352.4900	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	0.8190	2	3	0.0000	0.0000	0.0000
C	0.0001	3	0	0.0000	0.0000	0.0000
R	52.8450	3	0	70.3290	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 1.010

NODE	VOLT MAG	VOLT PHASE
1	437.6964	43.9766
2	434.9517	44.4332
3	417.0638	42.4830

				BRANCH VOLTAGE		BRANCH CURRENT	FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
				MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
VSWR											
R	1-	2	1.000	4.43	-7.510	4.43	-7.510	61.52	77.31	60.52	77.31
L	2-	3	0.819	23.02	82.490	4.43	-7.510	60.52	77.31	60.52	72.11
C	3-	0	0.000	417.06	42.483	0.40	132.483	0.00	-1050.53	0.00	-1050.53
R	3-	0	52.845	417.06	42.483	4.74	-10.596	52.85	70.33	52.85	70.33

Method of Moments Model Details for Towers Driven Individually – WQYK

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5. One wire was used to represent each tower. The top and bottom wire end points were specified using meters in the Cartesian coordinate system, as converted from the theoretical directional antenna specifications taking into account the carrier frequency wavelength. Each tower was modeled using 10 wire segments. As the towers are physically 96.0 degrees in electrical height, the segment length is 9.6 electrical degrees.

The individual tower characteristics were adjusted to provide a match of their modeled impedances, when presented to a circuit model which included branches representing the stray capacitances and feedline hookup inductances with the base impedances that were measured at the output jacks of the Antenna Tuning Units while the other towers of the array were open circuited. The method of moments model assumed loads at ground level having the reactances that were calculated for them using the base circuit models for the open circuited towers of the array.

Each tower's modeled height relative to its physical height falls within the required range of 75 to 125 percent and each modeled radius falls within the required range of 80 percent to 150 percent of the radius of a circle having a circumference equal to the sum of the widths of the tower sides. The array consists of identical, uniform cross section towers having a face width of 24 inches.

TOWER	Physical Height (meters)	Modeled Height (meters)	Modeled Percent of Height	Modeled Radius (meters)	Percent Equivalent Radius
1	79.2	84.2	106.3	0.36	1.24
2	79.2	85.1	107.4	0.36	1.24
3	79.2	85.6	108.1	0.36	1.24

The following pages show the details of the method of moments models for the individually driven towers. The numerals in the file names shown on the tabulations correspond to the tower numbers.

Tower 1

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1,010.	68.961	81.69	106.91	49.8	3.7747	-4.7146	-1.7895

GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.36	10
		0	0	84.2		
2	none	162.43	175.	0	.36	10
		162.43	175.	85.1		
3	none	324.86	175.	0	.36	10
		324.86	175.	85.6		

Number of wires = 3
current nodes = 30

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	8.42	3	8.56
segment/radius ratio	1	23.3889	3	23.7778
radius	1	.36	1	.36

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1,010.	0	1	.0283663	.0288379

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,000.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	11	0	-3,151.	0	0	0
2	21	0	-1,050.	0	0	0

Tower 2

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 11, sector 1							
1,010.	73.569	87.459	114.29	49.9	3.9792	-4.4613	-1.9246

GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.36	10
		0	0	84.2		
2	none	162.43	175.	0	.36	10
		162.43	175.	85.1		
3	none	324.86	175.	0	.36	10
		324.86	175.	85.6		

Number of wires = 3
current nodes = 30

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	8.42	3	8.56
segment/radius ratio	1	23.3889	3	23.7778
radius	1	.36	1	.36

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1,010.	0	1	.0283663	.0288379

Sources

source	node	sector	magnitude	phase	type
1	11	1	1,000.	0	voltage

Lumped loads

passive load circuit	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	
1	1	0	-3,151.	0	0	0
2	21	0	-1,050.	0	0	0

Tower 3

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 21, sector 1							
1,010.	73.55	91.316	117.25	51.2	4.179	-4.2391	-2.0536

GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.36	10
		0	0	84.2		
2	none	162.43	175.	0	.36	10
		162.43	175.	85.1		
3	none	324.86	175.	0	.36	10
		324.86	175.	85.6		

Number of wires = 3
current nodes = 30

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	8.42	3	8.56
segment/radius ratio	1	23.3889	3	23.7778
radius	1	.36	1	.36

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1,010.	0	1	.0283663	.0288379

Sources

source	node	sector	magnitude	phase	type
1	21	1	1,000.	0	voltage

Lumped loads

passive load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	circuit
1	1	0	-3,151.	0	0	0
2	11	0	-3,151.	0	0	0

Method of Moments Model Details for Daytime Directional Antenna- WQYK

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5 with the individual towers characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. The following pages contain details of the method of moments model of the directional antenna pattern.

Tower	Wire	Base Node
1	1	1
2	2	11
3	3	21

It should be noted that voltages and currents shown on the tabulations that are not specified as "rms" values are the corresponding peak values.

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MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1010 KHz

tower	field ratio magnitude	phase (deg)
1	.562	19.5
2	1.	0
3	.507	-19.5

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	1,123.45	84.7	15.1598	23.5
11	2,257.69	61.5	26.3194	5.3
21	1,061.45	38.6	13.4877	345.9

Sum of square of source currents = 2,208.9
Total power = 50,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00604437	-.00793094
Y(1, 2)	.000905647	-.00210296
Y(1, 3)	-.000207455	.000871018
Y(2, 1)	.000905621	-.00210297
Y(2, 2)	.00569219	-.00789042
Y(2, 3)	.000784795	-.0019926
Y(3, 1)	-.000207454	.00087102
Y(3, 2)	.000784779	-.0019926
Y(3, 3)	.00533656	-.00732918

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	68.4996	82.0265
Z(1, 2)	-23.6604	-16.0187
Z(1, 3)	15.7249	7.12597
Z(2, 1)	-23.6602	-16.019
Z(2, 2)	72.5167	87.9844
Z(2, 3)	-24.5708	-16.3682
Z(3, 1)	15.7248	7.1261
Z(3, 2)	-24.5707	-16.3683
Z(3, 3)	73.219	91.5014

GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.36	10
		0	0	84.2		
2	none	162.43	175.	0	.36	10
		162.43	175.	85.1		
3	none	324.86	175.	0	.36	10
		324.86	175.	85.6		

Number of wires = 3
current nodes = 30

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	8.42	3	8.56
segment/radius ratio	1	23.3889	3	23.7778
radius	1	.36	1	.36

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1,010.	0	1	.0283663	.0288379

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,588.79	84.7	voltage
2	11	1	3,192.86	61.5	voltage
3	21	1	1,501.12	38.6	voltage

IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1,010.	35.746	64.916	74.107	61.2	4.2354	-4.1805	-2.0894
source = 2; node 11, sector 1							
1,010.	47.787	71.237	85.781	56.1	3.8674	-4.5962	-1.8512
source = 3; node 21, sector 1							
1,010.	47.728	62.573	78.697	52.7	3.3438	-5.359	-1.4944

CURRENT rms
Frequency = 1010 KHz
Input power = 50,000. watts
Efficiency = 100. %
coordinates in meters

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	15.1598	23.5	13.9004	6.04967
2	0	0	8.42	15.9438	21.6	14.8212	5.87677
3	0	0	16.84	15.9795	20.5	14.9646	5.60417
4	0	0	25.26	15.4814	19.7	14.5764	5.21561
5	0	0	33.68	14.4916	19.	13.7022	4.71753
6	0	0	42.1	13.047	18.4	12.3792	4.12074
7	0	0	50.52	11.1881	17.9	10.6466	3.43852
8	0	0	58.94	8.95859	17.4	8.54673	2.6851
9	0	0	67.36	6.39833	17.	6.11798	1.87324
10	0	0	75.78	3.52063	16.6	3.37329	1.00781
END	0	0	84.2	0	0	0	0
GND	-161.812	-14.1567	0	26.3194	5.3	26.2057	2.44416
12	-161.812	-14.1567	8.51	27.8651	2.8	27.8319	1.36134
13	-161.812	-14.1567	17.02	28.0434	1.3	28.0356	.65896
14	-161.812	-14.1567	25.53	27.2559	.2	27.2556	.114026
15	-161.812	-14.1567	34.04	25.5776	359.3	25.5759	-.29432
16	-161.812	-14.1567	42.55	23.074	358.6	23.067	-.571245
17	-161.812	-14.1567	51.06	19.8175	357.9	19.8044	-.718534
18	-161.812	-14.1567	59.57	15.8871	357.3	15.87	-.738134
19	-161.812	-14.1567	68.08	11.3559	356.8	11.3383	-.632471
20	-161.812	-14.1567	76.59	6.25073	356.3	6.23781	-.4017
END	-161.812	-14.1567	85.1	0	0	0	0
GND	-323.624	-28.3134	0	13.4877	345.9	13.0825	-3.28152
22	-323.624	-28.3134	8.56	14.169	343.4	13.576	-4.05625
23	-323.624	-28.3134	17.12	14.196	341.9	13.4919	-4.41546
24	-323.624	-28.3134	25.68	13.7503	340.7	12.9806	-4.53569
25	-323.624	-28.3134	34.24	12.8675	339.8	12.0769	-4.44079
26	-323.624	-28.3134	42.8	11.5801	339.	10.8127	-4.14519
27	-323.624	-28.3134	51.36	9.92447	338.3	9.22385	-3.66275
28	-323.624	-28.3134	59.92	7.9405	337.7	7.34854	-3.00843
29	-323.624	-28.3134	68.48	5.66517	337.2	5.22206	-2.19641
30	-323.624	-28.3134	77.04	3.11242	336.7	2.85817	-1.23206
END	-323.624	-28.3134	85.6	0	0	0	0

Method of Moments Model Details for Nighttime Directional Antenna- WQYK

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5 with the individual towers characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. The following pages contain details of the method of moments model of the directional antenna pattern.

Tower	Wire	Base Node
1	1	1
2	2	11
3	3	21

It should be noted that voltages and currents shown on the tabulations that are not specified as "rms" values are the corresponding peak values.

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MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1010 KHz

tower	field ratio magnitude	phase (deg)
1	.667	13.5
2	1.	0
3	.617	-16.5

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	419.407	74.6	5.26945	18.5
11	624.481	62.8	7.7896	4.8
21	417.515	42.5	4.74609	349.4

Sum of square of source currents = 221.941
Total power = 5,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00604437	-.00793094
Y(1, 2)	.000905647	-.00210296
Y(1, 3)	-.000207455	.000871018
Y(2, 1)	.000905621	-.00210297
Y(2, 2)	.00569219	-.00789042
Y(2, 3)	.000784795	-.0019926
Y(3, 1)	-.000207454	.00087102
Y(3, 2)	.000784779	-.0019926
Y(3, 3)	.00533656	-.00732918

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	68.4996	82.0265
Z(1, 2)	-23.6604	-16.0187
Z(1, 3)	15.7249	7.12597
Z(2, 1)	-23.6602	-16.019
Z(2, 2)	72.5167	87.9844
Z(2, 3)	-24.5708	-16.3682
Z(3, 1)	15.7248	7.1261
Z(3, 2)	-24.5707	-16.3683
Z(3, 3)	73.219	91.5014

GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.36	10
		0	0	84.2		
2	none	162.43	175.	0	.36	10
		162.43	175.	85.1		
3	none	324.86	175.	0	.36	10
		324.86	175.	85.6		

Number of wires = 3
current nodes = 30

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	8.42	3	8.56
segment/radius ratio	1	23.3889	3	23.7778
radius	1	.36	1	.36

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1,010.	0	1	.0283663	.0288379

Sources

source	node	sector	magnitude	phase	type
1	1	1	593.131	74.6	voltage
2	11	1	883.149	62.8	voltage
3	21	1	590.456	42.5	voltage

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1,010.	44.4	66.057	79.592	56.1	3.7101	-4.8009	-1.7462
source = 2; node 11, sector 1							
1,010.	42.467	67.997	80.169	58.	3.9512	-4.4943	-1.9063
source = 3; node 21, sector 1							
1,010.	52.845	70.329	87.97	53.1	3.597	-4.9601	-1.6695

CURRENT rms
Frequency = 1010 KHz
Input power = 5,000. watts
Efficiency = 100. %
coordinates in meters

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	5.26944	18.5	4.99753	1.67084
2	0	0	8.42	5.54937	16.1	5.33062	1.5427
3	0	0	16.84	5.5675	14.8	5.38328	1.42034
4	0	0	25.26	5.39877	13.7	5.24435	1.28201
5	0	0	33.68	5.05758	12.9	4.93026	1.12767
6	0	0	42.1	4.55663	12.2	4.45444	.9596
7	0	0	50.52	3.9099	11.5	3.8311	.780978
8	0	0	58.94	3.13257	11.	3.0755	.595233
9	0	0	67.36	2.2385	10.4	2.20148	.405422
10	0	0	75.78	1.23233	9.9	1.2138	.212891
END	0	0	84.2	0	0	0	0
GND	-161.812	-14.1567	0	7.78958	4.8	7.76276	.645875
12	-161.812	-14.1567	8.51	8.22081	2.5	8.21297	.359017
13	-161.812	-14.1567	17.02	8.25679	1.2	8.25497	.173197
14	-161.812	-14.1567	25.53	8.01207	.2	8.01201	.0292846
15	-161.812	-14.1567	34.04	7.50861	359.4	7.5082	-.0783099
16	-161.812	-14.1567	42.55	6.76578	358.7	6.76409	-.151036
17	-161.812	-14.1567	51.06	5.80493	358.1	5.80184	-.189466
18	-161.812	-14.1567	59.57	4.64936	357.6	4.6453	-.194231
19	-161.812	-14.1567	68.08	3.32052	357.1	3.31637	-.166105
20	-161.812	-14.1567	76.59	1.82631	356.7	1.82327	-.10529
END	-161.812	-14.1567	85.1	0	0	0	0
GND	-323.624	-28.3134	0	4.74609	349.4	4.66558	-.870498
22	-323.624	-28.3134	8.56	5.02298	346.6	4.8867	-1.16212
23	-323.624	-28.3134	17.12	5.05518	345.	4.88303	-1.30799
24	-323.624	-28.3134	25.68	4.91365	343.8	4.71786	-1.37323
25	-323.624	-28.3134	34.24	4.61156	342.8	4.40457	-1.36609
26	-323.624	-28.3134	42.8	4.16052	341.9	3.9551	-1.29115
27	-323.624	-28.3134	51.36	3.57351	341.2	3.38253	-1.15259
28	-323.624	-28.3134	59.92	2.86479	340.5	2.70094	-.954954
29	-323.624	-28.3134	68.48	2.04759	339.9	1.92329	-.702539
30	-323.624	-28.3134	77.04	1.12684	339.4	1.05466	-.396833
END	-323.624	-28.3134	85.6	0	0	0	0

Summary of Post Construction Certified Array Geometry- WQYK

The tower locations based on the relative distances in meters and azimuths (referenced to true north) provided on the certified survey drawing of Appendix A were compared to the relative distances and azimuths relative to true north of the array elements specified on the construction permit. The surveyed and specified values were converted to the rectangular coordinate system to facilitate finding the individual tower specified-to-surveyed differences, which were then converted to the polar coordinate system to determine their magnitudes. This tabulation shows those distances and other information that is relevant to their determination.

Tower	Specified Array Geometry			Post-Construction Certification*		Distance From Specified Base Location	
	Spacing (Deg.)	Spacing (Meters)	Azimuth (Deg. T.)	Spacing (Meters)	Azimuth (Deg. T.)	(Meters)	(Deg.)
1	197.0	162.43	355.0	162.62	355.1	0.34	0.41
2	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
3	197.0	162.43	175.0	162.64	175.1	0.35	0.43

*From August 5, 2009 Record Survey Plan prepared by KCI Technologies, Tampa, Florida (Florida License No.: LB 6901)

The "as built" tower displacements from their specified locations expressed in electrical degrees at carrier frequency, which correspond to space phasing differences in the far-field radiation pattern of the array, are well below the +/- 3 degree operating phase range specified for antenna monitor parameters by the FCC Rules.

Sampling System Measurements – WQYK

Impedance measurements were made of the antenna monitor sampling system using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The measurements were made looking into the antenna monitor ends of the sampling lines for two conditions – with and without the sampling lines connected to the sampling devices at the tower bases under open-circuited conditions.

The following table shows the frequencies above and below the carrier frequency where resonance – zero reactance corresponding with low resistance – was found. As the length of a distortionless transmission line is 180 electrical degrees at the difference frequency between adjacent frequencies of resonance, and frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sampling line length at the resonant frequency below carrier frequency – which is the closest one to the carrier frequency in terms of the ratio of frequencies – was found to be 450 electrical degrees. The electrical lengths at carrier frequency appearing in the table below were calculated by ratioing the frequencies.

Tower	Sampling Line Open-Circuited Resonance Below 1010 kHz (kHz)	Sampling Line Open-Circuited Resonance Above 1010 kHz (kHz)	Sampling Line Calculated Electrical Length at 1010 kHz (degrees)	1010 kHz Measured Impedance with Sampling Loop Connected (Ohms)
1	864.672	1212.306	525.6	49.4 - j0.8
2	864.675	1212.750	525.6	50.8 + j0.1
3	864.240	1211.659	525.9	49.7 - j0.3

The sampling line lengths meet the requirement that they be equal in length within 1 electrical degree.

The characteristic impedance was calculated using the following formula, where $R_1 + jX_1$ and $R_2 + jX_2$ are the measured impedances at the +45 and –45 degree offset frequencies, respectively:

$$Zo = ((R_1^2 + X_1^2)^{1/2} \bullet (R_2^2 + X_2^2)^{1/2})^{1/2}$$

Tower	+45 Degree Offset Frequency (kHz)	+45 Degree Measured Impedance (Ohms)	-45 Degree Offset Frequency (kHz)	-45 Degree Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
1	778.2	7.9 - j49.5	951.1	10.4 +j49.9	50.5
2	779.8	7.9 -j49.6	953.0	10.3 +j49.9	50.6
3	777.8	7.9 -j49.7	950.7	10.3 +j49.8	50.6

The sampling line measured characteristic impedances meet the requirement that they be equal within 2 ohms.

The toroidal transformers were calibrated by measuring their outputs with a common reference signal using a Hewlett-Packard 8751A network analyzer in a calibrated measurement system. They were placed side-by-side with a conductor passing the reference signal passing through them and their outputs were fed into the A and B receiver inputs of the analyzer which was configured to measure the relative ratios and phases of their output voltages. The following results were found for carrier frequency, 1320 kilohertz:

Tower	Ratio	Phase(Degrees)
1	0.9823	+0.03
2	REF.	REF.
3	0.9844	-0.09

Delta type TCT-1 toroidal transformers are rated for absolute magnitude accuracy of +/- 2% and absolute phase accuracy of +/- 3 degrees. As the maximum measured transformer-to-transformer variations among of the four were approximately 0.1 percent and 0.1 degree, they provide far more accurate relative indications than could be the case within their rated accuracies.

Reference Field Strength Measurements – WQYK

Reference field strength measurements were made using a Potomac Instruments field strength meter of known calibration at three locations along radials at the azimuths having monitor points and, additionally, on a major lobe radial at 90 degrees true for each directional pattern. The measured field strengths, descriptions and GPS coordinates for the reference measurement points are shown on the following pages

Reference Field Strength Measurements

WQYK - Day

Radial	Point	Distance (km)	Field (mV/m)	Coordinates(NAD83)		Description
18.5	1	2.19	65.0	28-00-34.5	82-14-39.9	12940 Star Country Lane
	2	3.58	60.0	28-01-17.4	82-14-24.1	13068 Newsome Road
	3	4.69	29.0	28-01-51.6	82-14-11.6	9477 N Gallagher Road
29.5	1	6.15	18.1	28-02-19.8	82-13-12.4	2749 Kirkland Road
	2	8.14	10.0	28-03-15.5	82-12-35.6	6391 Bob Head Road
	3	10.95	5.8	28-04-34.4	82-11-43.5	5674 Knights Griffin Road
90	1	3.11	670	27-59-26.8	82-13-11.2	3000 N Dover Rd.
	2	7.97	145	27-59-26.8	82-10-13.2	1994 Turkey Creek Rd.
	3	19.23	54.0	27-59-26.8	82-03-21.2	County Line Road south of Fancy Farms Road
199.5	1	5.31	9.2	27-56-44.1	82-16-9.7	503 Seffner Valrico Road
	2	6.52	11.2	27-56-7.2	82-16-24.5	305 South Oakwood
	3	7.09	4.6	27-55-49.7	82-16-31.5	709 Dew Bloom Road
310.5	1	6.59	5.8	28-01-44.8	82-18-9.3	6705 CR 579
	2	9.74	5.1	28-02-49.9	82-19-38.1	10939 Tom Folsom Road
	3	11.00	5.9	28-03-15.8	82-20-13.9	9454 East Fowler

All measurements made from 9/29/09 to 10/1/09 by Lee Rodby

Reference Field Strength Measurements

WQYK - Night

Radial	Point	Distance (km)	Field (mV/m)	Coordinates(NAD83)		Description
45	1	5.12	6.8	28-01-23.9	82-12-51.9	4615 Swinger Road
	2	6.61	2.7	28-01-58.1	82-12-13.2	2227 Bethlehem Road
	3	7.71	2.3	28-02-22.9	82-11-44.1	5661 Stafford Road
137.5	1	2.38	40.0	27-58-27.6	82-14-8.6	13417 Wheeler Road
	2	3.45	12.0	27-58-01.2	82-13-43.6	14036 Sydney Road
	3	7.38	4.8	27-56-23.6	82-12-10.9	348 Sydney Washer Road
90	1	3.11	140	27-59-26.8	82-13-11.0	3000 N Dover Rd.
	2	7.97	82.0	27-59-26.8	82-10-13.2	1994 Turkey Creek Rd.
	3	19.23	19.0	27-59-26.8	82-03-21.1	County Line Road south of Fancy Farms Road
175	1	5.07	15.1	27-56-42.8	82-14-49.3	2312 Washington Road
	2	4.26	19.6	27-57-9.1	82-14-51.2	2384 Crosby Avenue
	3	9.22	6.0	27-54-28.4	82-14-35.2	2406 Cedarcrest
212.5	1	4.08	8.5	27-57-34.9	82-16-24.6	769 E Windhorst
	2	4.85	7.4	27-57-13.1	82-16-39.1	951 Kingsway Rd
	3	6.37	4.3	27-56-31.6	82-17-8.9	301 Parsons Ave N
305	1	3.16	15.9	28-00-25.8	82-16-39.7	1017 North Kingsway Road
	2	6.14	5.8	28-01-21.4	82-18-09.0	6525 CR 579
	3	9.99	5.1	28-02-32.2	82-20-04.9	9618 Harney Road
355	1	2.59	8.6	28-00-50.1	82-15-17.6	1750 East US 92
	2	3.83	18.7	28-01-30.8	82-15-17.6	6887 Muck Pond Road
	3	6.27	4.6	28-02-49.4	82-15-27.4	580 W of McIntosh

All measurements made from 9/29/09 to 10/1/09 by Lee Rodby

Direct Measurement of Power - WQYK

Common point impedance measurements were made using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The measurements were made at the phasor cabinet input jack adjacent to the common point current meter that is used to determine operating power. The resistance value was adjusted to provide the correct input power with the specified common point current. The reactance value was adjusted to cancel incidental inductance in the circuit between the transmitter output port and the common point in the phasor cabinet, including the main-auxiliary switching contactor, to provide a non-reactive load for the transmitter at carrier frequency.

Antenna Monitor and Sampling System - WQYK

The antenna monitor is a Potomac Instruments model AM-1901. The sampling devices for the towers are Delta Electronics Type TCT-1 shielded toroidal transformers located at the ATU output reference points. The TCT-1 transformers have a sensitivity of 0.5 volt per ampere of RF current. The toroids are connected through equal length inch foam heliax sampling lines to the antenna monitor.

RFR Protection - WQYK

The measures to restrict human exposure to radio frequency fields, by limiting access to areas with field levels that might exceed the limits specified in 47 CFR 1.1310 with fencing around the tower base areas and cabinet enclosures for the indoor antenna system equipment, previously provided to the FCC remain in force at the WQYK transmitter site. No changes have been made to the authorized directional antenna patterns.